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Shaw

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(54) **ADJUSTABLE WHEEL RACK**

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B66F 7/28 (2006.01)

(52) **U.S. Cl.**
CPC ***B66F 7/28*** (2013.01); ***A47F 7/04*** (2013.01)

(58) **Field of Classification Search**
USPC 248/481, 482, 521, 516, 181.1, 181.2, 248/288.31; 211/23, 24
See application file for complete search history.

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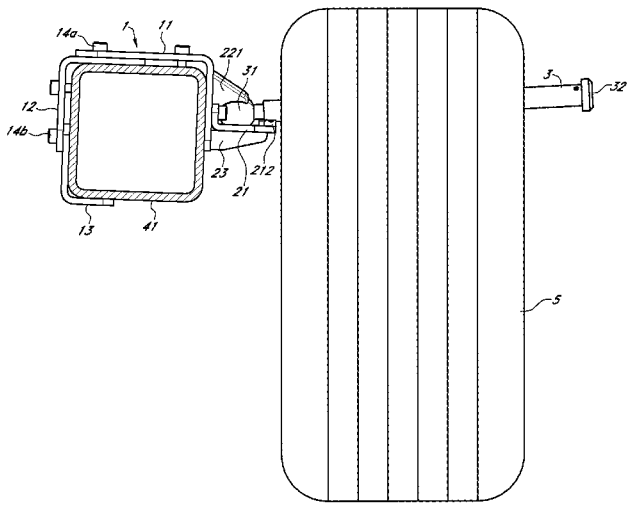
(57) **ABSTRACT**

In one embodiment, a wheel rack includes a locking frame plate having a first L-shaped plate, a second L-shaped plate, and a stopper plate. A ball seat is fixed to the locking frame plate, and a rod has a first end with a sphere attached thereto. The locking frame plate is configured to be fixed to a jamb of a vehicle lift. In another embodiment, a wheel rack includes a locking frame plate having a first L-shaped plate, a second L-shaped plate, and a stopper plate. A ball seat is fixed to the locking frame plate. The wheel rack also includes a locking seat and a rod that has an end with a sphere attached thereto. The locking frame plate is configured to be fixed to a jamb of a vehicle lift.

18 Claims, 6 Drawing Sheets



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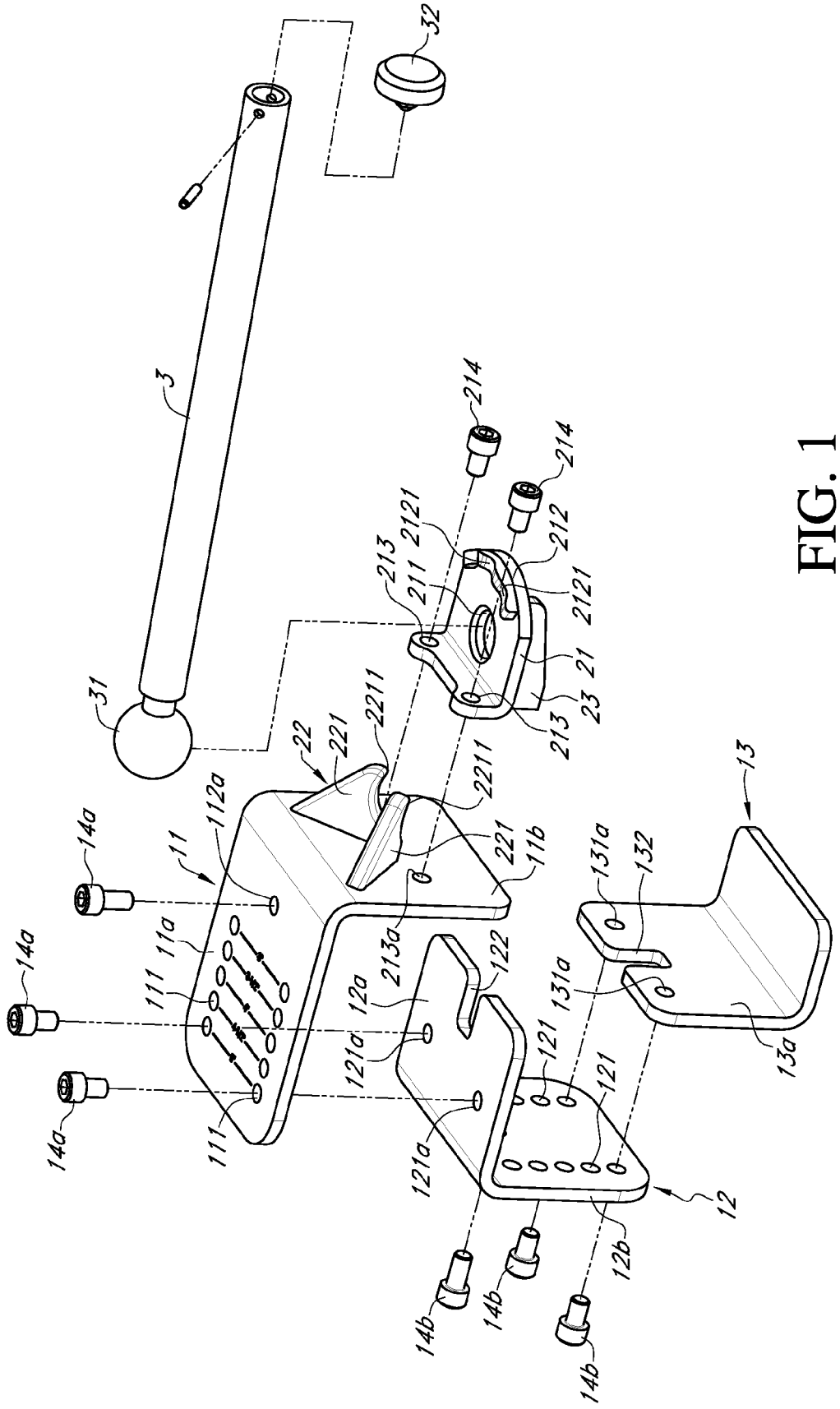
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FIG. 1

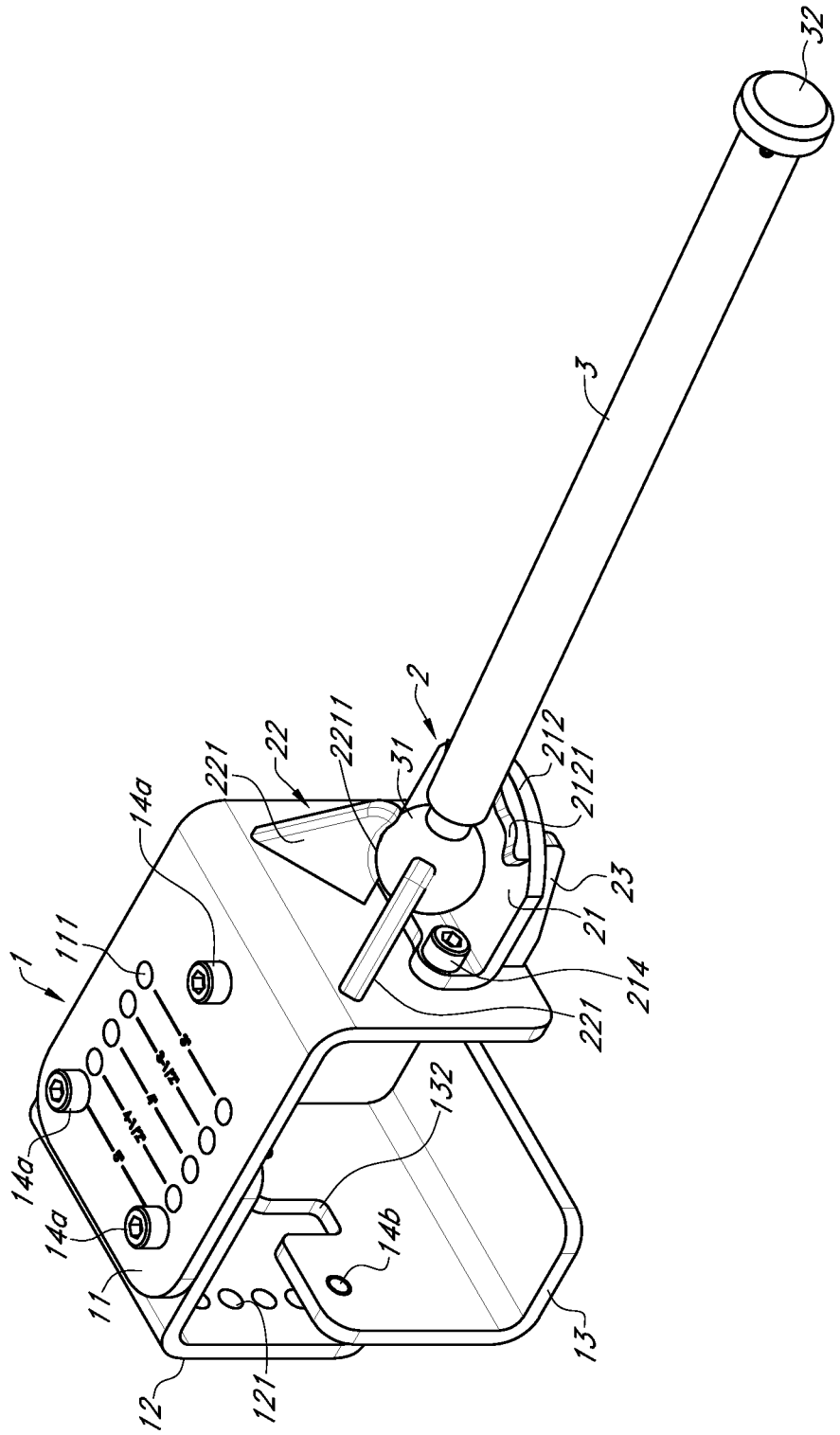
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FIG. 2

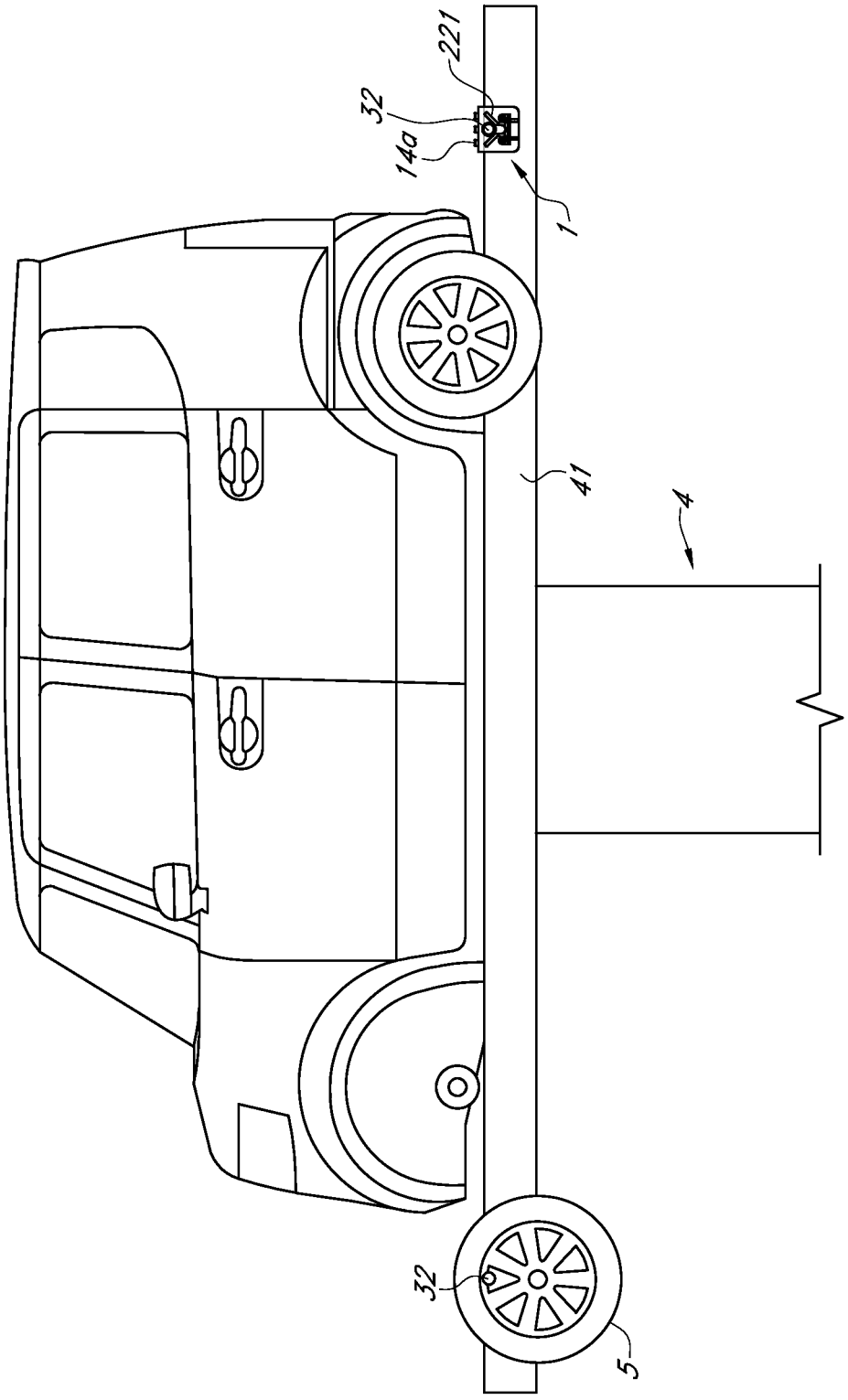

FIG. 3

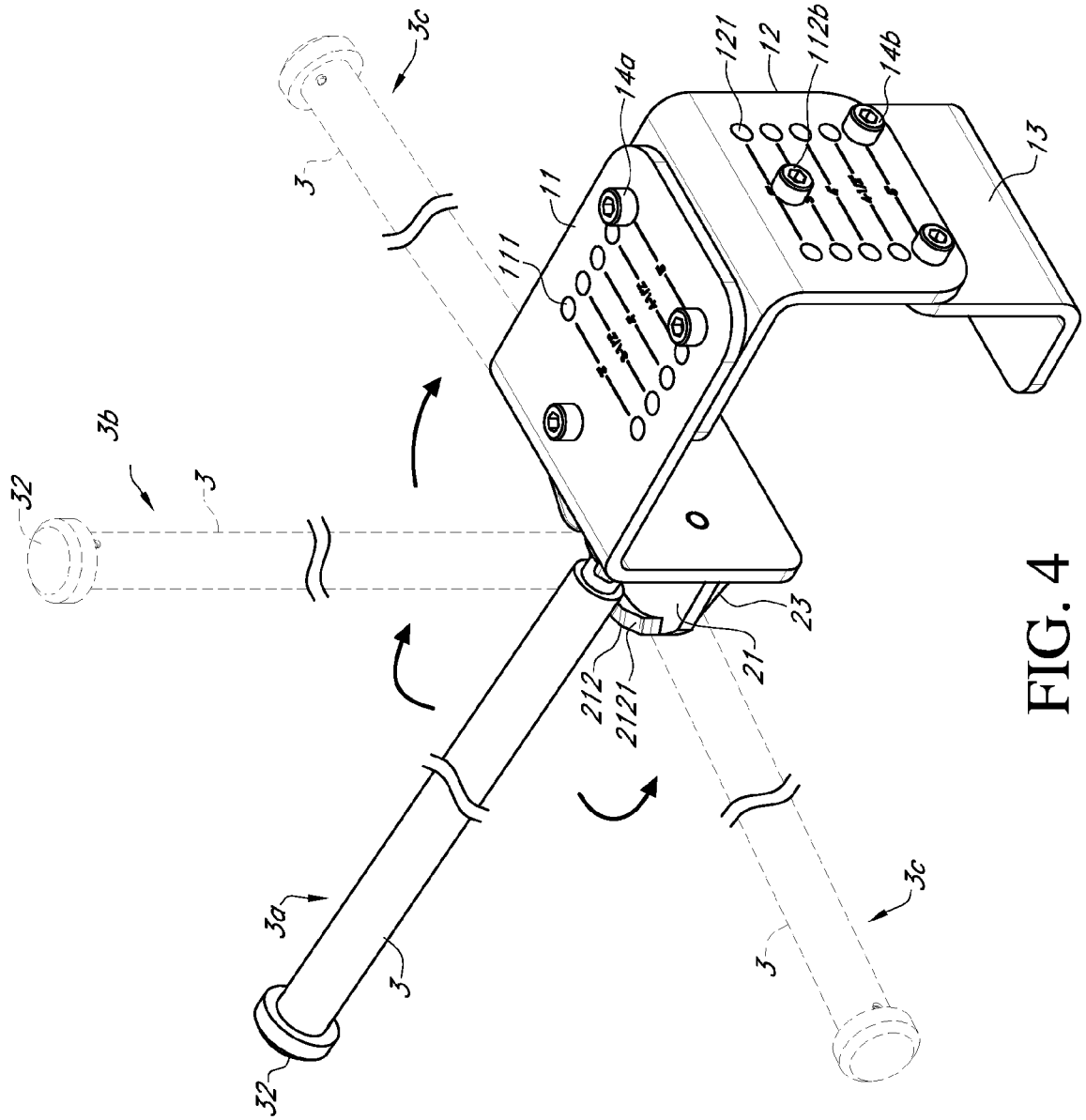

FIG. 4

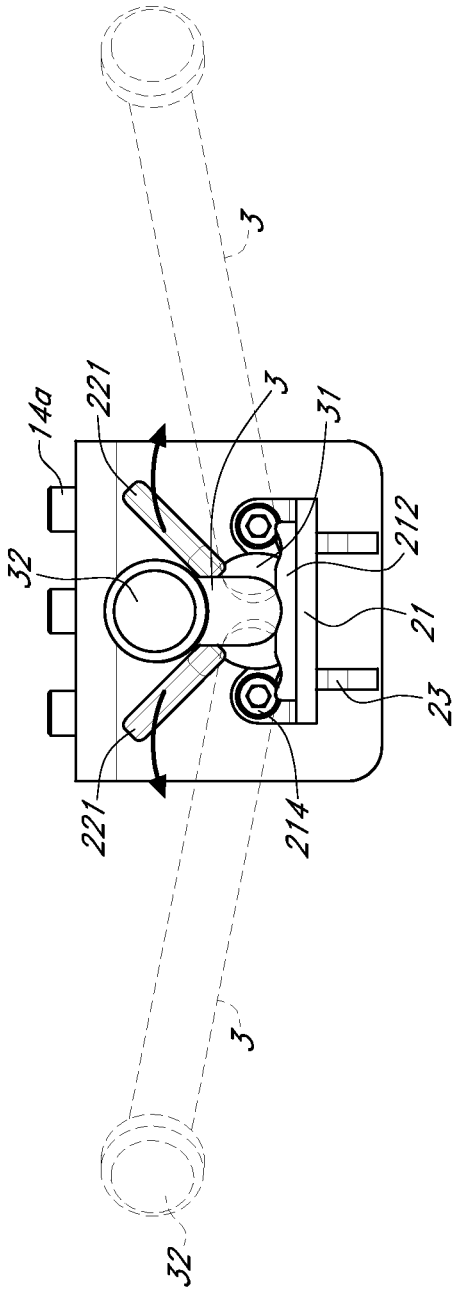

FIG. 5

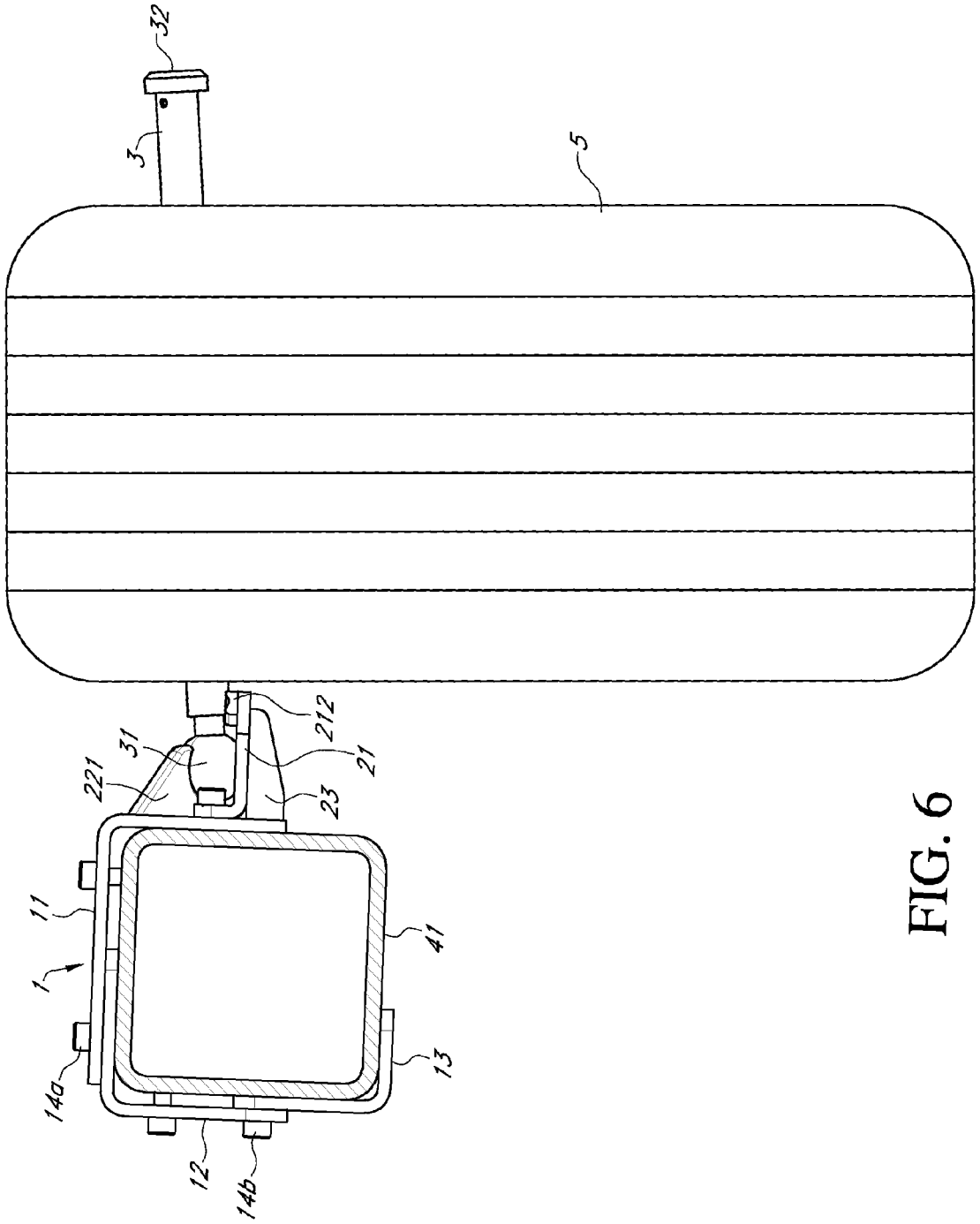

FIG. 6

ADJUSTABLE WHEEL RACK

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims priority to Taiwanese patent application number 102218617, filed Oct. 4, 2013; this application also claims priority to Chinese patent application number 201320625529.3, filed Oct. 11, 2013. The disclosures of each are incorporated herein in their entirety by reference.

BACKGROUND

Vehicle lifts come in various sizes. Consequently, add on devices, such as wheel racks, are manufactured specifically for each size of jamb provided with different vehicle lifts. Purchasing a separate wheel rack for each different jamb and/or vehicle lift is expensive and duplicative. Devices and methods set forth herein may provide for an adjustable wheel rack for use with various vehicle lifts and jamb sizes.

SUMMARY

The following presents a simplified summary of the invention in order to provide a basic understanding of some aspects of the invention. This summary is not an extensive overview of the invention. It is not intended to identify critical elements of the invention or to delineate the scope of the invention. Its sole purpose is to present some concepts of the invention in a manner that is easily understood as an introduction to the more detailed description which follows.

In one embodiment, a wheel rack includes a locking frame plate having a first L-shaped plate, a second L-shaped plate, and a stopper plate. A ball seat is fixed to the locking frame plate, and a rod has a first end with a sphere attached thereto. The locking frame plate is configured to be fixed to a jamb of a vehicle lift.

In another embodiment, a wheel rack includes a locking frame plate having a first L-shaped plate, a second L-shaped plate, and a stopper plate. A ball seat is fixed to the locking frame plate. The wheel rack also includes a locking seat and a rod that has an end with a sphere attached thereto. The locking frame plate is configured to be fixed to a jamb of a vehicle lift.

In still another embodiment, a method of using a wheel rack includes providing a locking frame plate that includes a first L-shaped plate having a horizontal contact surface and a vertical contact surface, a second L-shaped plate having a horizontal contact surface and a vertical contact surface, and a stopper plate. At least one aperture in the horizontal contact surface of the first L-shaped plate aligns with one aperture in the vertical contact surface of the second L-shaped plate and the plates are securely fastened.

A locking seat, and a rod having a first end and a second end, where a sphere is attached to the first end and a stopper is attached to the second end is provided.

The method further includes providing a ball seat which is fixed to the locking frame plate. The ball seat includes a ball receiving plate having a cavity and a protruding block that is secured to the ball receiving plate. The protruding block has at least one recessed area for accommodating the rod.

The sphere is secured between the cavity of the ball receiving plate and the locking seat, and may be rotated such that the rod is in a substantially perpendicular position relative to the vertical contact surface of the first L-shaped plate. The rod is placed in at the at least one recessed area of the protruding block, and the wheel is placed on the rod.

BRIEF DESCRIPTION OF THE DRAWINGS

Illustrative embodiments of the present invention are described in detail below with reference to the attached drawing figures.

FIG. **1** is an exploded perspective view of a wheel rack, according to one embodiment of the invention.

FIG. **2** is a perspective view of the wheel rack of FIG. **1**.

FIG. **3** is a front view, showing the wheel rack of FIG. **1** in use.

FIG. **4** is a perspective view of the wheel rack of FIG. **1** showing the rod in motion.

FIG. **5** is a front view of the wheel rack of FIG. **4** showing the rod in motion.

FIG. **6** is a side view, showing the wheel rack of FIG. **1** in use.

DETAILED DESCRIPTION

Embodiments of the present invention provide a type of adjustable wheel rack in combination with a vehicle lift system to provide an easily adaptable and accessible station to store a wheel, facilitating vehicle maintenance work.

The wheel rack is described in detail with reference to FIGS. **1** through **6**. The rack includes a locking frame plate **1**, a stopper plate **13**, a ball seat **2**, a locking seat **22**, and a rod **3**.

The locking frame plate **1** may be formed, for example, by fastening together a first L-shaped plate **11** and a second L-shaped plate **12**. A horizontal contact surface **11***a* of the first L-shaped plate **11** contacts a horizontal contact surface **12***a* of the second L-shaped plate **12** in forming the locking frame plate **1**. Bolt holes **111** may be drilled along the length of the horizontal contact surface of the first L-shaped plate **11***a*. For example, FIGS. **1** and **2** show five rows of bolt holes **111** drilled into the horizontal contact surface **11***a* at intervals of 3", 3-½", 4", 4-½", and 5". Additional or fewer bolt holes **111** may be drilled into the horizontal contact surface **11***a*, and some embodiments may include continuous elongated slots instead of individual holes.

While reference is made herein to bolts **14***a*, **14***b*, **214** and bolt holes **111**, **121**, **121***a*, **131***a*, **213**, openings drilled or formed into the first L-shaped plate **11**, the second L-shaped plate **12**, or the stopper plate **13** may be configured to accept any satisfactory fastening member, such as a screw, pin, et cetera.

Corresponding bolt holes **121***a* drilled into the horizontal contact surface **12***a* of the second L-shaped plate **12** allow bolts **14***a* to be inserted through the bolt holes **111** to secure the two plates **11**, **12** together.

A stopper plate **13** may be provided to further support the locking frame plate **1** on a side column **41** of vehicle lift **4**. At least one row of spaced bolt holes **121** drilled on the vertical contact surface **12***b* of the second L-shaped plate **12** correspond to at least one row of spaced bolt holes **131***a* drilled into the stopper plate **13**. Bolts **14***b*, or any other acceptable fastener, may be inserted through bolt holes **121**, **131***a* to secure the vertical contact surface of the stopper plate **13***a* to the second L-shaped plate **12**.

When the first L-shaped plate **11**, the second L-shaped plate **12**, and the stopper plate **13** are secured together, the locking frame plate **1** is configured to hug the side column **41**, as shown in FIG. **6**. The locking frame plate **1** may be adjusted by varying the connections discussed above to meet a particular size of the side column **41**.

A thru hole **112***a* in the horizontal contact surface **11***a* of the first L-shaped plate **11** and a thru hole **112***b* in the vertical contact surface **12***b* of the second L-shaped plate **12** (FIG. **4**) correspond to holes **122**, **132** in the second L-shaped plate **12** and the stopper plate **13**, respectively. Bolts **14***a* may be inserted into the thru holes **112***a*, **112***b* and concave holes **122**, **132** to contact the side column **41** for ensuring that the locking plate **1** does not slip relative to the side column **41**.

A scale may be provided on the outside edge of the horizontal contact surface **11***a* of the first L-shaped plate **11** (as shown in FIGS. **1** and **2**) and on the outside edge of the vertical contact surface **12***b* of the second L-shaped plate **12** (FIG. **4**) to allow users to easily identify dimensions. When the user determines the dimensions of the side column **41**, he or she may then adjust the first L-shaped plate **11** and the second L-shaped plate **12** accordingly, and secure the two plates **11**, **12** together via the bolts **14***a* or other acceptable fasteners inserted through the bolt holes **111**, **121***a*. The second L-shaped plate **12** and the stopper plate **13** may be similarly adjusted.

A ball seat **2** and locking seat **22** may be attached to a vertical contact surface **11***b* of the first L-shaped plate **11**, providing a support system for the rod **3**. The ball seat **2** may include a ball receiving plate **21** and a support block **23**, as shown in FIG. **1**.

A cavity **211** in the ball receiving plate **21** receives a sphere **31** on the end of the rod **3**, and the locking seat **22** prevents the sphere **31** (and thus the rod **3**) from undesirably detaching. In one embodiment, the diameter of the cavity **211** may be slightly smaller than the diameter of the sphere **31** on the end of the rod **3** such that the sphere **31** sits on the cavity **211** without falling through. Additionally, this may allow the sphere **31**, and thus the rod **3**, to rotate on the ball receiving plate **21**.

In some embodiments, the locking seat **22** includes at least two stopper plates **221** secured to the vertical contact surface **11***b* of the first L-shaped plate **11**. Each stopper plate **221** has a curved surface **2211** to prevent the rod **3** from separating from the ball receiving plate **21** while allowing the rod **3** to pivot vertically and horizontally.

With reference to FIGS. **4** and **5**, the rod **3** may be rotated from a ready-for-use position **3***a* (e.g., a substantially horizontal position wherein the rod **3** is perpendicular to the vertical support surface **11***b* of the first L-shaped plate **11**) to a substantially vertical position **3***b* when the rod **3** is not in use. Alternatively, the rod **3** may be horizontally to substantially parallel to positions **3***c*.

When in the ready-for-use position **3***a*, the rod **3** may be supported by a protruding block **212** located, for example, on an outside edge of the ball receiving plate **21**. The protruding block **212** may include various recessed arcs **2121** providing several options for positioning the rod **3** and inhibits movement of the rod **3**. As shown in FIG. **5**, the rod **3** may be positioned on-center, or at various angles off-center as the recessed arcs **2121** allow.

As may be seen in FIG. **5**, the support blocks **23** positioned beneath the ball receiving plate **21** may be provided to further support the ball receiving plate **21** and the rod **3**.

The ball receiving plate **21** may be secured to the vertical contact surface **11***b* of the first L-shaped plate **11** using any acceptable fastening means (e.g., welding, bolts, etc.). Holes **213** in the ball receiving plate **21** may be matched up with holes **213***a* drilled in the vertical contact surface **11***b* of the first L-shaped plate **11** to ensure correct placement of the ball receiving plate **21**. Bolts **214** may be inserted into the holes **213** to secure the ball receiving plate **21** to the vertical contact surface **11***b* of the first L-shaped plate **11**. Alternative means of securing the ball receiving plate **21** to the first L-shaped plate **11***b* (for example, welding or chemical bonding) may also be used.

The rod **3** may be cylindrical as shown in FIGS. **1**-**6**. Alternatively, the rod **3** may be rectangular, hexagonal, or octagonal, for example. A stopper **32** may be provided at an opposite end of the rod **3** from the sphere **31** to prevent a wheel **5** from sliding off of the rod **3**.

An example of the locking frame plate **1** in use with a vehicle lift **4** is shown in FIG. **3**. A side column **41** provides support for a vehicle when the vehicle lift **4** is extended. The locking frame plate **1** may be positioned near the ends of the side column **41** as shown in FIG. **4**. However, the locking frame plate **1** may be positioned anywhere on the side column **41** as is convenient for providing maintenance to the vehicle.

The wheel **5** may be positioned on the rod **3** (FIG. **6**) while maintenance is being performed on the vehicle. The stopper **32** prevents the wheel **5** from slipping off the end of the rod **3**. When maintenance on the vehicle is complete, the wheel **5** is removed from the rod **3**, and secured to the vehicle.

Many different arrangements of the various components depicted, as well as components not shown, are possible without departing from the spirit and scope of the present invention. Embodiments of the present invention have been described with the intent to be illustrative rather than restrictive. Alternative embodiments will become apparent to those skilled in the art that do not depart from its scope. A skilled artisan may develop alternative means of implementing the aforementioned improvements without departing from the scope of the present invention.

It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations and are contemplated within the scope of the claims. Not all steps listed in the various figures need be carried out in the specific order described.

The invention claimed is:

1. A wheel rack, comprising:

a locking frame plate, comprising:

a first L-shaped plate;

a second L-shaped plate;

a stopper plate;

a ball seat fixed to the locking frame plate; and

a rod having a first end with a sphere attached thereto, the sphere being received by the ball seat;

wherein:

the locking frame plate is configured to be fixed to a jamb of a vehicle lift;

the first L-shaped plate, the second L-shaped plate, and the stopper plate are adjustably secured together to fit around and be fixed to the jamb;

at least one aperture in a horizontal contact surface of the second L-shaped plate is configured to align with at least one aperture in a horizontal contact surface of the first L-shaped plate; and

the first L-shaped plate and the second L-shaped plate are secured together by inserting at least one fastener through the aligned apertures of the first L-shaped plate and the second L-shaped plate.

2. The wheel rack of claim **1**, wherein the horizontal contact surface of the first L-shaped plate has at least two rows of apertures such that first L-shaped plate and the second L-shaped plate are adjustably secured together.

3. The wheel rack of claim **1**, wherein the at least one fastener is selected from the group consisting of: bolts, screws, pins, and rivets.

4. The wheel rack of claim 1, wherein the rod is configured to receive and hold a wheel of a vehicle.

5. A wheel rack, comprising:
a locking frame plate, comprising:
a first L-shaped plate;
a second L-shaped plate;
a stopper plate;
a ball seat fixed to the locking frame plate; and
a rod having a first end with a sphere attached thereto, the sphere being received by the ball seat;
wherein:
the locking frame plate is configured to be fixed to a jamb of a vehicle lift;
the first L-shaped plate, the second L-shaped plate, and the stopper plate are adjustably secured together to fit around and be fixed to the jamb;
at least one aperture in the vertical contact surface of the stopper plate is configured to align with at least one aperture in a vertical contact surface of the second L-shaped plate; and
the second L-shaped plate and the stopper plate are secured together by inserting at least one fastener through the aligned apertures in the first L-shaped plate and the second L-shaped plate.

6. The wheel rack of claim 5, wherein the vertical contact surface of the second L-shaped plate has at least two rows of apertures such that the second L-shaped plate and the stopper plate are adjustably secured together.

7. The wheel rack of claim 5, wherein the at least one fastener is selected from the group consisting of: bolts, screws, pins, and rivets.

8. The wheel rack of claim of claim 5, wherein the rod further has a stopper on an opposing second end, and wherein the rod is configured to support a wheel between the first end and the second end.

9. A wheel rack, comprising:
a locking frame plate comprising:
a first L-shaped plate;
a second L-shaped plate; and
a stopper plate;
a ball seat fixed to the locking frame plate;
a locking seat; and
a rod having an end with a sphere attached thereto;
wherein:
the locking frame plate is configured to be fixed to a jamb of a vehicle lift; and the ball seat comprises:
a ball receiving plate having a cavity;
a protruding block; and
a support block.

10. The wheel rack of claim 9, wherein the cavity is configured to accept the sphere on the end of the rod.

11. The wheel rack of claim 10, wherein the rod is configured to support a wheel of a vehicle.

12. The wheel rack of claim 9, wherein the protruding block is secured to the outer edge of the ball receiving plate and has at least one recessed area for accommodating the rod.

13. A wheel rack, comprising:
a locking frame plate comprising:
a first L-shaped plate;
a second L-shaped plate; and
a stopper plate;
a ball seat fixed to the locking frame plate;
a locking seat; and
a rod having an end with a sphere attached thereto;
wherein:
the locking frame plate is configured to be fixed to a jamb of a vehicle lift; and
the locking seat comprises two plates secured to a vertical contact surface of the first L-shaped plate, each plate having a curved surface for securing the sphere on the end of the rod onto the ball seat.

14. The wheel rack of claim 13, wherein the sphere is rotatable between the ball receiving plate and the locking seat such that the rod is positioned substantially perpendicular to the vertical contact surface of the first L-shaped plate when in use and substantially parallel to the vertical contact surface of the first L-shaped plate when not in use.

15. The wheel rack of claim 14, wherein, when in use, the rod is configured to support a wheel of a vehicle.

16. A wheel rack, comprising:
a locking frame plate comprising:
a first L-shaped plate;
a second L-shaped plate; and
a stopper plate;
a ball seat fixed to the locking frame plate;
a locking seat; and
a rod having an end with a sphere attached thereto;
wherein:
the locking frame plate is configured to be fixed to a jamb of a vehicle lift; and
the ball seat includes a ball receiving plate having a cavity and a protruding block, the protruding block being secured to the ball receiving plate and having at least one recessed area for accommodating the rod.

17. The wheel rack of claim 16, wherein the rod is configured to receive and hold a wheel of a vehicle.

18. A method for using a wheel rack, comprising:
providing a locking frame plate comprising:
a first L-shaped plate having a horizontal contact surface and a vertical contact surface;
a second L-shaped plate having a horizontal contact surface and a vertical contact surface; and
a stopper plate having a vertical contact surface;
wherein at least one aperture in the horizontal contact surface of the first L-shaped plate and one aperture in the vertical contact surface of the second L-shaped plate are aligned and securely fastened using a fastener; and
wherein at least one aperture in the vertical contact surface of the second L-shaped plate and one aperture in the vertical contact surface of the stopper plate are aligned and securely fastened using a fastener;
providing a rod having a first end and a second end, wherein a sphere is attached to the first end and a stopper is attached to the second end;
providing a ball seat fixed to the locking frame plate, the ball seat further comprising:
a ball receiving plate having a cavity; and
a protruding block secured to the ball receiving plate, the protruding block having at least one recessed area for accommodating the rod;
providing a locking seat;
securing the sphere between the cavity of the ball receiving plate and the locking seat;
rotating the sphere such that the rod is in a substantially perpendicular position relative to the vertical contact surface of the first L-shaped plate;
placing the rod in the at least one recessed area of the protruding block; and
placing a wheel on the rod.

* * * * *